



Remarks on Special Issue on the Business Segment of Chemicals & Materials

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This special issue on the business segment of chemicals and materials is the first-ever publication in the long history of the Nippon Steel Technical Report. Nippon Steel Chemical & Material Co., Ltd., as a non-ferrous segment company in the Nippon Steel group, has developed products from a wide range of materials, including carbon, organic, inorganic, metallic, and composite materials. This issue provides an introduction to some of those products.

Many of the products are closely related to the steelmaking process. Example products are as follows: Various carbon materials – including needle coke for graphite electrodes, special carbon materials for semiconductor manufacturing equipment, carbon black, and carbon fiber which are derived from coal tar, a by-product of coke production from coal; basic aromatic chemical products such as benzene, toluene, and their derivatives which are derived from crude light oil, similarly a by-product of coke production; fused spherical fillers for semiconductor encapsulation, which are manufactured using thermal spraying technology for furnace material repair; other notable products including bonding wires for semiconductors developed based on metal microstructure control technology; and metallic foil manufactured through precision rolling techniques.

In recent years, efforts have been strengthened to develop high value added functional materials. Examples of such materials are as follows: In the field of electronics, resins for semiconductor substrate materials adapted for high-speed communications based on aromatic chemical technology; flexible copper-clad laminate materials for wiring; organic Electroluminescence materials and resist ink to be applied to high-definition displays; and fillers and bonding wires for power semiconductor packages. We have also developed porous carbon to be used as catalyst carriers for fuel cells in the energy field and light-weight high-strength materials made of combinations of carbon fibers and various types of resins in the structural material field. This issue presents various materials and technologies for each target field, along with generic technologies that support them. Additionally, it includes examples of support provided through material element technologies and analytical techniques from the R & D Laboratories of Nippon Steel Corporation, which has collaborated in their development.

The present generation is regarded as the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) age where the future is unpredictable. As simple backcasting strategies are no lon-

ger sufficient, the importance of research and development continues to grow. Major transformations such as the emergence of AI may dramatically alter product designs, which may change the required material properties. Additionally, the creation of new materials may have the potential to revolutionize the entire system as well. The research and development in the future requires the capability to flexibly incorporate new innovations to adapt to various changes while establishing a strong foundation with the accumulated technologies as the core. The principle of fu'eki ryūkō – balancing enduring fundamentals with evolving trends – will be essential. Possessing expertise in a diverse range of material technologies provides a significant advantage in responding to change. Leveraging this strength, we remain committed to developing cutting-edge materials and components in a timely manner, leading to future editions of the Special Issue on the Business Segment of Chemicals & Materials.